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AN INEXPENSIVE CONSTANT-TEMPERATURE OVEN

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At times a constant-temperature oven is very important in the conduct of certain phases of biological work, and the original cost of a satisfactory commercial unit prohibits consideration. The constant-temperature oven shown in figure 2 was made entirely from commercial products. The cost of the complete unit, including a standardized and reliable thermoregulator, was $21, exclusive of labor. Although low-priced constant-temperature ovens are available on the market, such ovens are usually constructed of thin asbestos board, which does not provide proper insulation, and are equipped with an unreliable type of thermoregulator which often varies at least 5° F., thus imposing insurmountable handicaps upon the performance of accurate and reliable research.

The shell for the oven described in this circular was constructed of a popular make of compressed asbestos board one-half inch thick, held rigid at the corners by means of small right angles and $\frac{1}{8}$-inch brass machine bolts. The asbestos board was cut to order at the factory, thus saving time and waste and insuring a good appearance of the finished unit.

The oven, as shown in figures 1 and 2, is 16 inches high, 14 inches wide, and $12\frac{1}{2}$ inches deep. This size permits most average size vessels to be placed on the shelves, and in case large objects are to be dried the upper shelf may be removed. The dimensions of the seven pieces of compressed asbestos board for the assembly are:

2 pieces 12 by 16 inches, $\frac{1}{2}$ inch thick
2 pieces 12 by 13 inches, $\frac{1}{2}$ inch thick
2 pieces 14 by 16 inches, $\frac{1}{2}$ inch thick
1 piece $9\frac{3}{4}$ by $11\frac{3}{4}$ inches, $\frac{1}{2}$ inch thick

The size of the opening ($8\frac{1}{2}$ by $10\frac{1}{2}$ inches) permits the removal of the shelves. The piece removed for the opening was bolted to the center of the smaller board ($9\frac{3}{4}$ by $11\frac{3}{4}$ inches), which was used for the door. Prior to assembling the shell the contact edges of the board were covered with alundum cement to insure an air-tight oven. Refrigerator hinges and clasps were used for the door. Cheaper hinges may be used, but a machined suspension eliminates future trouble. To complete the shell, the corners were protected with brass fittings, and 1-inch bolt covers were used on the bottom as supports.

The heating unit shown in figure 3 was made from $\frac{1}{4}$-inch compressed asbestos board. The top dimensions of the heating element are 7 by 10 inches, with 2-inch sides. Half-inch openings were left at each end of the heating unit to permit free passage of air over the coils. The heating coils were made from 2-inch strips of the asbestos board and suspended from the top of the unit by means of $\frac{1}{8}$-inch brass machine bolts. Prior to winding the heating coils the edges of the asbestos strips were notched with a steel saw. This notching acts as a separator when the coil is heated and thus prevents a short circuit within the heating element. The two coils were wound with a total of 25 feet of no. 24 chromel wire, and connected in series. Twenty-one half-inch holes were made in the heating unit directly over the heating elements to facilitate circulation of air in the oven.

The shelves were constructed from 4-mesh hardware cloth, reinforced on the edges with folded 24-gage galvanized sheet iron. The corners of the reinforcements were soldered in order to increase rigidity. The shelves were supported within the oven on small right angles. The bimetallic thermoregulator was mounted on the side of the oven. In case it is necessary to purchase a thermoregulator, the new-type contact points should be specified. The old-type points will not give satisfactory control when used in series with heavy loads. The old-type regulators may be used in series with an inexpensive relay by reversing the action of the regulator.

The following material should be purchased prior to the assembling, in addition to the compressed asbestos board mentioned above:

2 square feet of $\frac{1}{4}$-inch compressed asbestos board
1 pair of $\frac{1}{2}$-inch offset refrigerator hinges
1 refrigerator fastener
4 1-inch nickel-plated bolt caps or nickel-plated steel glides
1 bimetallic thermoregulator
8 brass corners 2 by 2 inches
8 cadmium-coated angle irons $\frac{1}{2}$ by 1 by 1 inch
16 cadmium-coated angle irons $\frac{1}{2}$ by 2 by 2 inches
7 dozen brass machine bolts ($\frac{1}{8}$ by 1 inch) with nuts
1 piece hardware cloth 13 by 24 inches
9 feet of 1-inch strip of 24-gage galvanized sheet iron, folded in the center at the tin shop

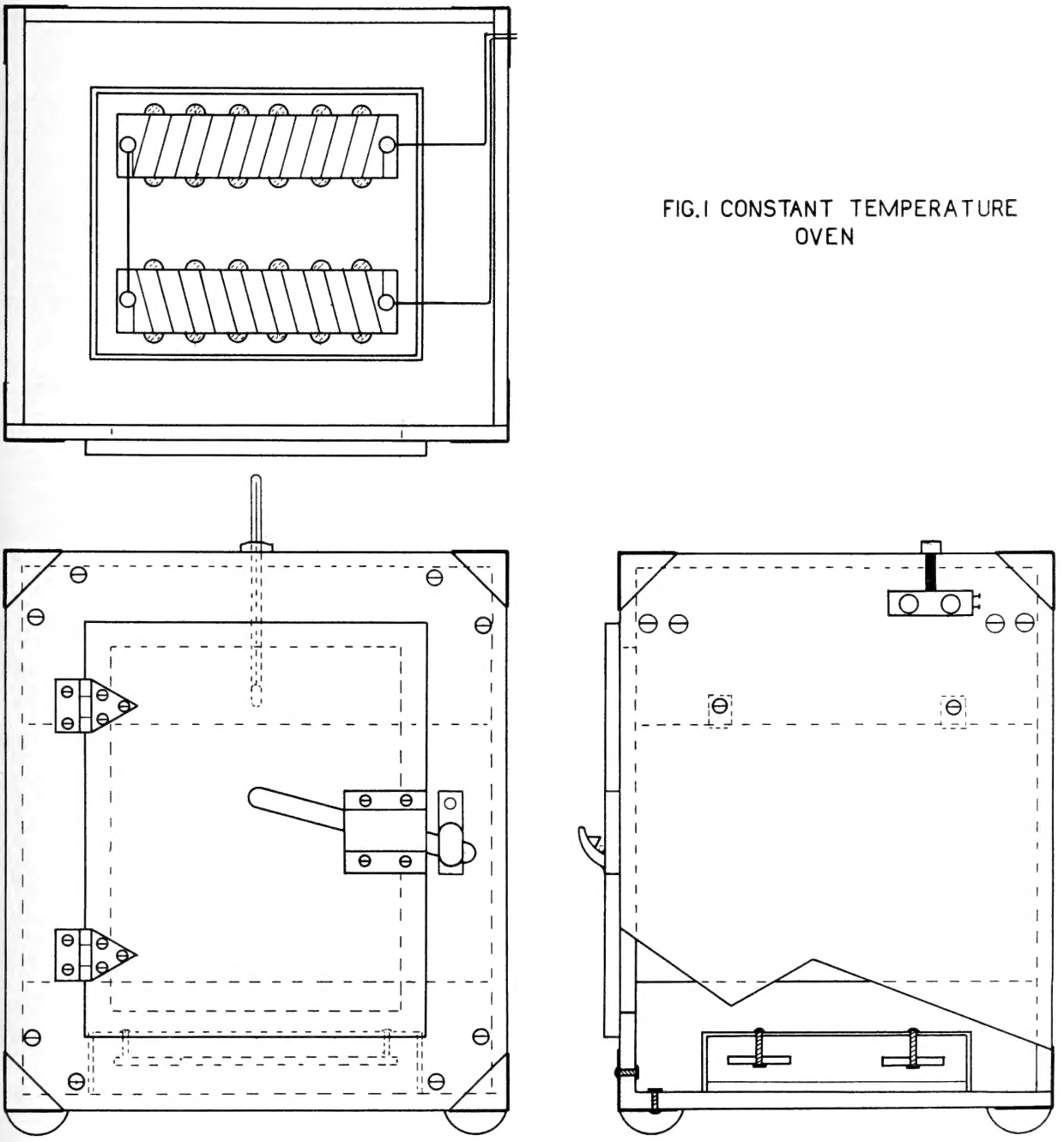

FIG.I CONSTANT TEMPERATURE OVEN

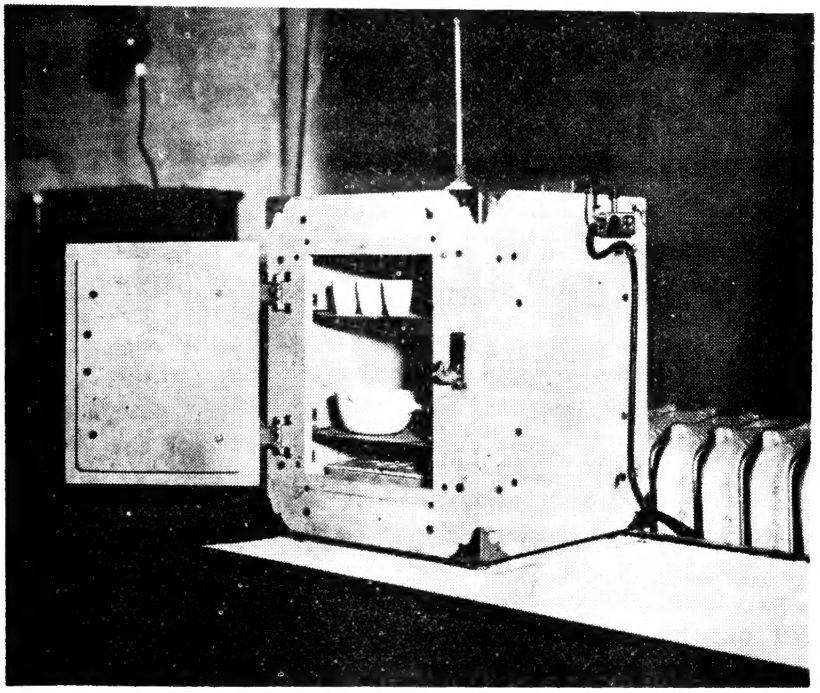

Figure 2.--Photograph of oven showing heating unit and shelves.

Figure 3.--Heating unit. Note close winding of front coil to insure even heating when door is opened.